

viduals above and gave the effect of a walking "Y." Carmine particles ingested by the various heads indicated that each animal had an independent alimentary canal.

The rarity of the preceding condition can be appreciated in that it was the only such abnormality we have observed in a microscopic examination of approximately 150,000 eggs during the past three years.

#### LITERATURE CITED

Raven, Chr. P. and Beenackers, A. M., 1955. On the nature of head malformations obtained by centrifuging the eggs of *Lymnaea stagnalis*. J. Embryol. Exp. Morph., 3:286-303.

### THE LAND SNAIL GENUS MICROCONUS

BY FRED G. THOMPSON

The genus *Microconus* Strebel & Pfeffer may be defined as follows: Stylommatophorous Pulmonata of the subfamily Thysanophorinae. Shell small, helicoid, 2 to 3.5 mm. wide. Lip simple, not reflected. Umbilicus moderate, at most only partly obscured by reflected columella. Peristome varying from horn yellow to umber. Growth wrinkles numerous, fine and irregular, crossed by finer spiral striae which bead them (the spirals can only be seen with proper lighting under magnification  $\times 60$ ). Suture deeply impressed.

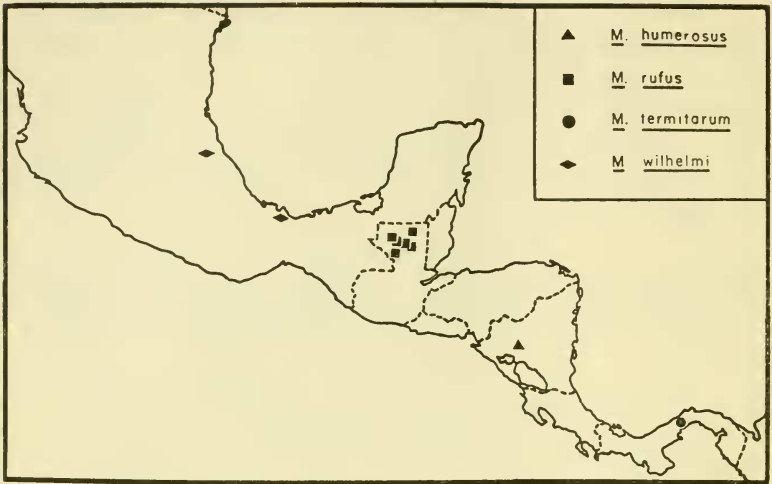
Genitalia with spermatheca lying above aorta; with a vestigial flagellum retained within wall of vas epiphallus; prostatic end of vas enlarged, with thick muscular wall; ovotestis bilobed; talon with a long stalk; carrefour exposed.

Jaw solid, with 5 to 7 broad ribs. Radular marginals relatively broad and with entocones. Digestive system as usual in Thysanophorinae. Salivary glands quite small, flattened, subcircular, touching above oesophagus and joined by isthmus below so as to form a complete, elongate or circular collar.

Lung (pl. 2, fig. A) a little more than twice as long as broad, and 2 or 3 times length of kidney. Heart relatively large. Principal lung vein without evident tributaries. Kidney triangular, longer than broad. Sigmurethrous ureter complete.

Tentacles black. Sole elongate, with parallel sides and rounded ends, crossed by about 20 dark folds and lighter sides. Tail with medio-dorsal groove.

In the Thysanophorinae, four genera are known anatomically: *Mcleania*, *Microconus*, *Microphysula* and *Thysanophora* (Baker, 1940). The structure of the penis, the vas epiphallus, and the shell relate *Microconus* more closely to *Thysanophora* than to



Map 1, Distribution of *Microconus*  
(N.B. Triangle is for *M. pilsbryi*.)

the other genera. However, *Microconus* differs from *Thysanophora* in 4 distinct ways: (1) the spermathecal sac lies above the aorta; (2) a vestigial flagellum is present; (3) the radular marginals have entocones (only ectocones in *Thysanophora*); and (4) the shell lacks protractive (more oblique) periostracal riblets (present in *Thysanophora*) but has fine, spiral striae.

*Distribution:* *Microconus* has been recorded from middle America, from the Canal Zone to central Veracruz, Mexico. All the 4 known species have been found in only limited regions (Map 1).

Dissections of *M. pilsbryi* were made under a dissecting microscope. The animals had been partially relaxed in the field with sodium nembutal; after fixation in formalin, they were preserved in 70% alcohol. Prior to dissection, the shells were dissolved in a 1% solution of HCl. The animals were then stained with borax-carmin. All drawings were made with aid of a camera lucida. Ridgeway was used for a color guide.

This work was done with the sponsorship and guidance of Dr. Henry van der Schalie. Dr. H. A. Pilsbry kindly loaned me the only specimen of *M. wilhelmi* in the Philadelphia Academy collections. Paul F. Basch made available to me his material of *M. rufus*.

The 4 species known to belong to *Microconus* are: *M. wilhelmi* (Pfeiffer), *M. rufus*, *M. pilsbryi*, and *M. termitarum* Pilsbry. Only *M. wilhelmi* and *M. pilsbryi* are known anatomically, but seem to represent two subgenera, one of which is described as new.

MICROCONUS Strebel & Pfeffer, type *Helix wilhelmi* Pfeiffer.

The typical subgenus is distinguished by its small spermatheca, its penial retractor attached to the diaphragm, and its vas deferens free from the side of the penis. The jaw has five ribs. The adult shell has a higher spire, but a larger umbilicus, which is  $1/3$  to  $1/4$  the shell diameter.

MICROCONUS WILHELMI (Pfeiffer).

*Helix wilhelmi* Pfr., 1866, pp. 79-80. *M. wilhelmi* Strebel & Pfeffer, 1880, pp. 29-30, pl. 4, fig. 7. Pilsbry, 1926, p. 80, fig. 12b. H. B. Baker, 1927, pp. 236-238, pl. 18, figs. 31-40 (anatomy).

Type locality: Mirador, Veracruz, Mexico. Also known from Necaxa, Veracruz.

MICROCONUS RUFUS, new species.

Pl. 1, figs. A, B

*Thysanophora conspurcatella* (Morelet) Goodrich & van der Schalie, 1937, p. 26.

Holotype: shell umbilicate, umbilicus about  $1/4$  shell diameter. Shell turbiniform, nearly as high as wide, with obtuse apex and  $4\frac{3}{4}$  whorls. Suture deeply impressed. Whorls strongly convex, shouldered; the last not descending. Embryonic whorls  $1\frac{1}{2}$ , smooth, protruding, horn yellow; remaining whorls horn yellow, with minute, but distinct, unequal, unevenly spaced, microscopic growth-wrinkles, which are cut by weakly incised, spiral lines. Aperture irregularly ovate, incised by penult whorl; columellar margin slightly reflected, but not obscuring umbilicus; peristome thin, glassy, and transparent. Height 2.8; diameter 3.5; width of umbilicus 1.0 mm.

Dept. Petén, Guatemala. Holotype: University Mich. Museum of Zoölogy (UMMZ.) 64416; knoll along Santa Ana Road, 2 km. south of Puebla Nueva (Henry van der Schalie! Feb. 15, 1935). Paratypes: UMMZ. 193099; same data; UMMZ. 193285-193314 (124 examples) from vicinity of Tikal (Paul F. Basch! Feb. 4 to May 16, 1956). Also examined: UMMZ. 64417, west shore of Lake Petenxil; UMMZ. 64418, limestone knoll east of road to Santa Ana, about  $1\frac{1}{4}$  miles south of Flores; UMMZ. 64419, limestone outcrop 1 mile northwest of Paso Caballo; UMMZ. 64420, limestone knoll, 5 miles north of Paso Caballo; UMMZ.

64421, north shore of Lake Yaluk, about 6 miles east of Paso Caballo; UMMZ. 64422, limestone outcrop, 6 miles south of Laguna Perdida.

*M. rufus* was abundant in jungle regions subjected to periodic rainy (usually June to August) and dry seasons. Since the collections were made during the dry season preceding the rains, only dead shells were found in samples of leaf mold and in debris along rivers.

Young individuals are relatively more depressed and have thinner shells, which makes the spiral striae more easily observed. *M. rufus* differs from *M. wilhelmi*, the other species of the typical subgenus, because the whorls of the former are more strongly convex, proportionately slightly larger and not so strongly shouldered, and have finer and closer growth-wrinkles. Also the embryonic whorls of *M. rufus* do not protrude so much, the body whorl lies further under the penultimate one; and the umbilicus is smaller.

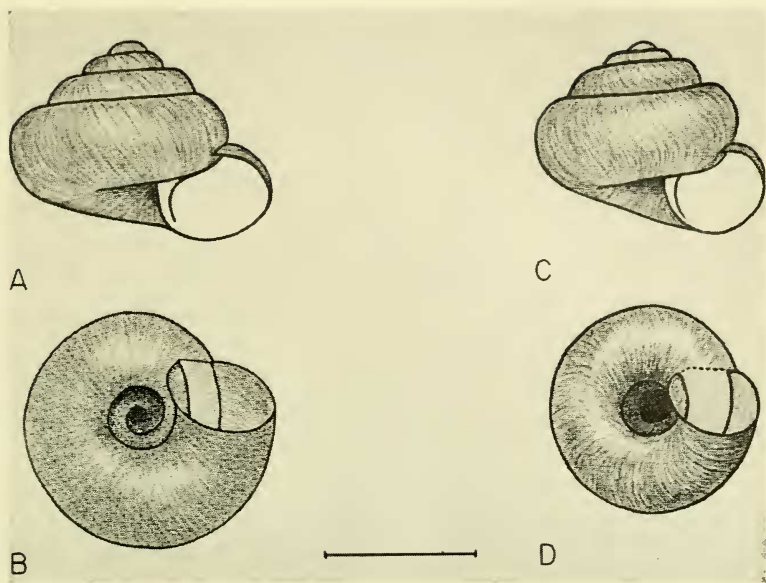
**PULCHRICONUS**, new subgenus. Type *M. pilsbryi*, n. sp.

This subgenus is characterized by a large spermatheca, and the absence of a penial retractor; the epiphallic end of the vas deferens is attached to the side of the penis by narrow bands of muscle fibers. The adult shell is ovate-globose, and the jaw has 7, broad ribs.

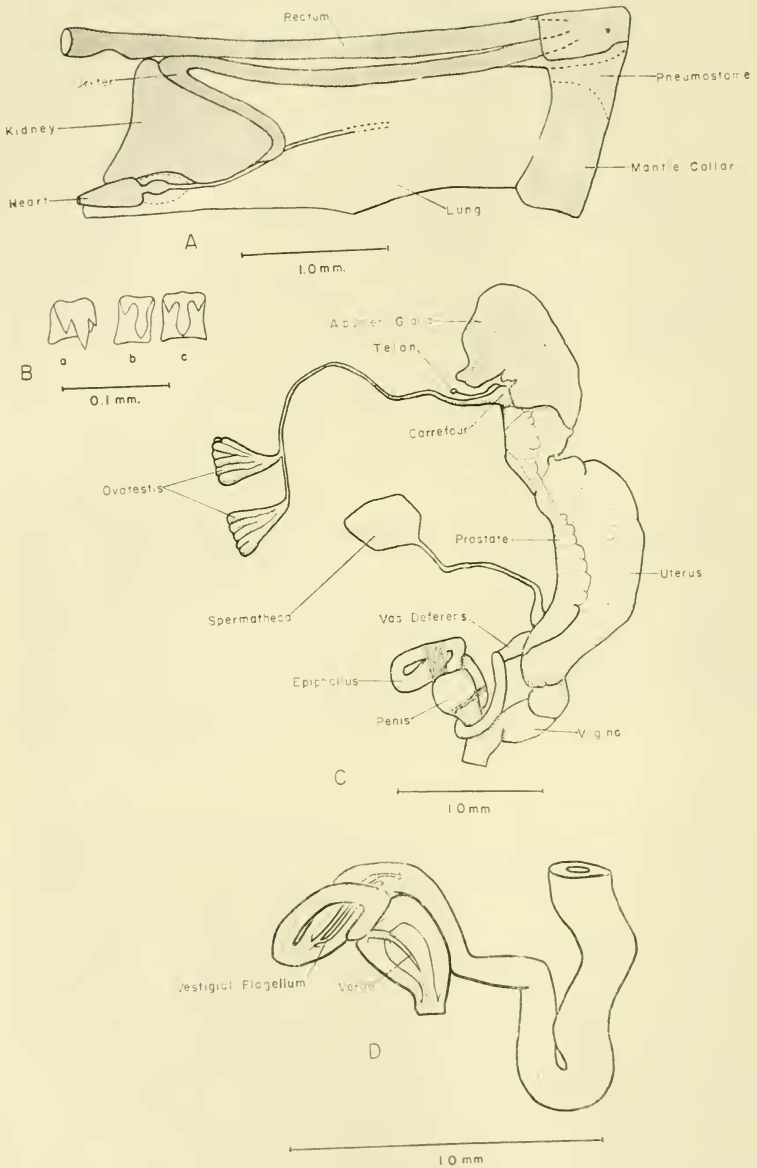
**MICROCONUS PILSBRYI**, new species. Pl. 1, figs. C, D; pl. 2, figs. A-D

Holotype: (pl. 1, figs. C and D) shell umbilicate, umbilicus about  $\frac{1}{4}$  shell diameter; shell slightly wider than high, with obtuse apex and  $4\frac{1}{2}$  whorls. Embryonic whorls  $1\frac{1}{2}$ , horn yellow, and showing under magnification ( $\times 60$ ) a reticulate pattern of fine granules, which reflect a slight iridescence. Remaining whorls clay color, dull, but with tendency to become burnt umber in color near suture and umbilicus; strongly convex and strongly shouldered; and minutely, but distinctly roughened by unequal, close, microscopic growth-wrinkles, cut by weakly incised, spiral lines. Suture deeply impressed. Last whorl descending towards aperture, which is broadly oval, somewhat incised by preceding whorl, and with columellar margin slightly reflected over umbilicus; peristome thin, but distinctly expanded, glassy and transparent. Height 2.2; diameter 2.5; width of umbilicus 0.6 mm.

Holotype: UMMZ. 193100;  $4\frac{1}{2}$  km. south of Matagalpa, Dept. Matagalpa, Nicaragua, 3,500 feet altitude (Thompson! July 16, 1956). Paratypes: UMMZ. 193101 (104 specimens); same data.



FIGS. A and B. *Microcoelus rufus* Thompson, holotype shell. FIGS. C and D, *M. pilsbryi* Thompson, holotype shell.



*Microconus pilsbryi* Thompson: FIG. A, internal view of lung and associated organs. FIG. B, radular teeth: a, marginal; b, lateral; c, central. FIG. C, male and female genital system. FIG. D, enlarged penis, epiphallus, and vas deferens, showing internal structures.